GCSE (9–1)

Computer Science

J276/01: Computer systems

General Certificate of Secondary Education

Mark Scheme for November 2020

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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Annotations

Annotation	Meaning
BP	Blank Page – this annotation **must** be used on all blank pages within an answer booklet (structured or unstructured) and on each page of an additional object where there is no candidate response.
^	Omission mark
BOD	Benefit of doubt
C	Subordinate clause/Consequential error
✖	Cross
E	Expansion of a point
FT	Follow through
NAQ	Not answered question
NBOD	Benefit of doubt not given
P	Point being made
REP	Repeat
/	Slash
✔	Tick

Subject Specific Marking Instructions

LEVELS OF RESPONSE QUESTIONS:
For answers marked by **levels of response**:
• to determine the level – start at the highest level and work down until you reach the level that matches the answer

• to determine the mark within the level, consider the following

The indicative content indicates the expected parameters for candidates' answers, but be prepared to recognise and credit unexpected approaches where they show relevance.

Using 'best-fit', decide first which set of BAND DESCRIPTORS best describes the overall quality of the answer. Once the band is located, adjust the mark concentrating on features of the answer which make it stronger or weaker following the guidelines for refinement*.

Highest mark: If clear evidence of all the qualities in the band descriptors is shown, the HIGHEST Mark should be awarded.

Lowest mark: If the answer shows the candidate to be borderline (i.e. they have achieved all the qualities of the bands below and show limited evidence of meeting the criteria of the band in question) the LOWEST mark should be awarded.

Middle mark: This mark should be used for candidates who are secure in the band. They are not 'borderline' but they have only achieved some of the qualities in the band descriptors.
Be prepared to use the full range of marks. Do not reserve (e.g.) high Band 3 marks 'in case' something turns up of a quality you have not yet seen. If an answer gives clear evidence of the qualities described in the band descriptors, reward appropriately.
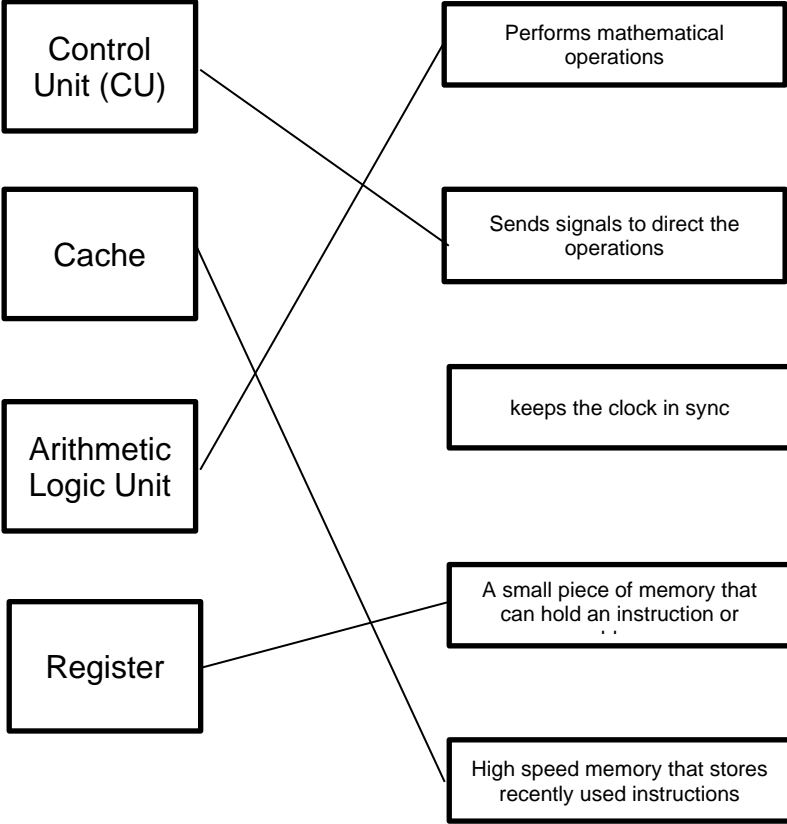*When only two marks are available (low mark band) only use Highest and Lowest mark guidance for 'best-fit'.

	AO2.1a	AO2.1b
High (thorough) (6 – 8 marks)	Precision in the use of terminology. Knowledge shown is consistent and well-developed. Clear appreciation of the question from a range of different perspectives making extensive use of acquired knowledge and principles of computer science.	Understanding of concepts is consistently applied to context enabling a logical and sustained argument to develop. Examples used enhance rather than detract from response.
Middle (reasonable) (3 – 5 marks)	Awareness of the meaning of the terms in the question. Knowledge is sound and effectively demonstrated. Demands of question understood although at times opportunities to make use of acquired knowledge and concepts are not always taken	Understanding of concepts is shown and is applied to context. There is clear evidence that an argument builds and develops through the response but there are times when opportunities are missed to use an example or relate an aspect of understanding to the context provided.
Low (basic) (1 – 2 marks)	Confusion and inability to deconstruct terminology as used in the question. Knowledge partial and superficial. Focus on question narrow and often one-dimensional.	Inability to apply understanding of key concepts in any sustained way to context resulting in tenuous and unsupported statements being made. Examples if used are for the most part irrelevant and unsubstantiated.
0 marks	No response or no response worthy of credit.	No response or no response worthy of credit.

Question			Answer	Mark	Guidance
1	a		1 mark for a suitable prevention <table><tr><td>**Threat**</td><td>**Prevention**</td></tr><tr><td>Unauthorised access</td><td>Firewall // (strong) password // physical security // access rights // security questions // two-step authentication</td></tr><tr><td>Virus</td><td>Anti-virus/malware // firewall // network restrictions e.g. no downloads // do not plug in unknown storage devices</td></tr><tr><td>Phishing</td><td>Firewall // do not click on unknown links // spam filter // education about what to do/not do // check sender/website to see if real/fake</td></tr><tr><td>Data interception</td><td>Encryption</td></tr></table>	4	Mark first in box Do not mark repeat
1	b		1 mark for each suitable threat, and 1 mark for suitable prevention e.g. Spyware (1) anti-spyware (1) Pharming (1) Check web address is valid(1) DOS/DDOS (1) Use of proxy server/firewall (1) Ransomware (1) Use of antimalware (1) SQL injection (1) Network forensics/suitable form validation (1) Social engineering // people as a weak point (1) training (1) Poor network policy (1) education/setting rules (1) Hardware failure/loss (1) Backup (1)	4	Award different types of virus e.g. worm, trojan separately. Do not award hacking, brute-force - both covered in unauthorised access. BOD malware

2	**a**		1 mark for LAN 1 mark per bullet for justification to max 2 • Small geographic area • They will own the hardware // dedicated hardware // do not need to use outside hardware // controlled by Hope	3	
2	**b**		Modem // router	1	Mark first given
2	**c**	**i**	1 mark per bullet to max 2 • Wifi signal/bandwidth will be weaker/less because // 5GHz is only short range • …bedroom further away from WAP than kitchen • ….to get to bedroom has to go through floor/walls etc.	2	
2	**c**	**ii**	1 mark per way e.g. • Change to 2.4Ghz • Install a signal booster // another WAP // mesh wifi • Move WAP closer to the bedroom • Remove obstructions // by example • Reduce number of devices connected • Change channel to one not being used in locality	2	Reduce interference is NE - they need to say how this can be achieved
2	**d**		1 mark per bullet to max 3 e.g. • **No** server (required for client-server) • Computers are **directly** connected to each other • Computers are independent / equal • Decentralised • Computers will have software installed/updated individually // no central installation/updates • Computers will need own security // no central security • Computers will have their own files // no central file storage • Less initial cost / maintenance • Specialist required to setup client-server • Easier to add new devices • Lesser need for file sharing • If any device fails/is removed the remainder can continue	3	Be careful MP1 is not just saying it does not need to connect to the server - the MP is that there is no server. Accept reasonable points in reverse.

2	e		1 mark per benefit to max 4, 1 mark per drawback to max 4 e.g. Benefit • Can access files from any device • … e.g. they can instantly access the data from laptop and mobile phone • Can access files from anywhere // Can access from anywhere with access to the Internet • Can pay for auto-backups // don't have to backup manually • Security **may be higher** than at home • May be free of cost • … you do not need to buy more hardware • **Easier/quicker** to share files with others • More available storage space on her device • Easier to increase storage capacity (not memory) • Can be used a backup in case of data loss Drawback • Cannot access files if no Internet access • Not in control of security (bod less secure) • …data may be hacked/stolen • May cost monthly fee • … which could be more long term than buying hardware • May not be a backup // if cloud storage fails you have lost your data • Data must be transferred to computer to read • …. may be intercepted • Connection may be slow • … therefore takes time to upload/download • May be issues as to who owns the data • If stop paying / leave subscription other storage for files needs to be found • If login details are forgotten/lost may not have access to files	6	Mark breadth and depth of knowledge. 1 mark for each valid point/expansion. Allow specific examples as expansions for each point. Mark benefits to max 4 first, then look for max 4 from drawbacks

3			1 mark per correct line from component to definition	4	Any 2 lines from 1 component = 0 mark

| 4 | | | **Mark Band 3–High Level** **(6-8 marks)** The candidate demonstrates a thorough knowledge and understanding of a wide range of considerations in relation to the question; the material is generally accurate and detailed. The candidate is able to apply their knowledge and understanding directly and consistently to the context provided. Evidence/examples will be explicitly relevant to the explanation. The candidate is able to weigh up both sides of the discussion and includes reference to the impact on all areas showing thorough recognition of influencing factors. *There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.* **Mark Band 2-Mid Level** **(3-5 marks)** The candidate demonstrates reasonable knowledge and understanding of a range of considerations in relation to the question; the material is generally accurate but at times underdeveloped. The candidate is able to apply their knowledge and understanding directly to the context provided although one or two opportunities are missed. Evidence/examples are for the most part implicitly relevant to the explanation. The candidate makes a reasonable attempt to discuss the impact on most areas, showing reasonable recognition of influencing factors. *There is a line of reasoning presented with some structure. The information presented is in the most part relevant and supported by some evidence.* **Mark Band 1-Low Level** **(1-2 marks)** The candidate demonstrates a basic knowledge of considerations with limited understanding shown; the material is basic and contains some inaccuracies. The candidate makes a limited attempt to apply acquired knowledge and understanding to the context provided. The candidate provides nothing more than an unsupported assertion. *The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.* **0 marks** No attempt to answer the question or response is not worthy of credit | 8 AO2 1a (4) AO2 1b (4) | The following is indicative of possible factors/evidence that candidates may refer to but is not prescriptive or exhaustive: **Indicative Content:** Ethical • Replacing people with machines • Loss of jobs • Community will suffer • Work will be completed faster • May find a cure faster • More reliable calculations • Save more lives Legal • More secure than people seeing personal data • May be at risk if not backed up • May be at risk of threats e.g. hackers • Who is responsible if there is an error Cultural • Removal of people from workforce • Change in demand for skills • Need people to manage the hardware/software instead of medical expertise • Skills may be lost |

5	a		1 mark for each correct word The operating system provides a user **interface**. This displays the output to the user and allows the user to interact with the **hardware**. The operating system controls the movement of data from a hard drive to **RAM** and vice-versa. This is known as memory management. The Operating system can only perform one process at a time, but by managing the memory the computer can appear to be completing more than one process at a time. This is known as **multitasking**. An operating system allows device **drivers** to be installed to allow an external piece of hardware to interact with the **processor**. The operating system provides security through user accounts and **passwords**. It also creates and maintains a file system to organise files and **directories.**	8	BOD hardware with peripherals/processor/printer

5	b	i	1 mark for:
			   • Collate free space together
			
			Max 2 from
			   • Collate file fragments together/contiguously
			   • All of **file 1** will be stored **consecutively**
			   • All of **file 2** will be stored **consecutively**
			   • All of **file 3** will be stored **consecutively**
				3	Allow diagram
					
					Do not award gives more free storage space.
					
					Do not award 'similar' files are grouped together.

5	b	ii	1 mark per bullet to max 2
			   • When one page is read it does not have to search for second page // does not have to search through all the pages // does not need to reassemble the individual pages
			   • Does not have to physically move as far to get the next part of the file
			   • Less physical movement saves time
			   • Multiple locations do not need accessing // fewer individual accesses
				2	Answer must relate to why it is faster.

5	b	iii	1 mark for each example e.g. • Backup • Encryption • Compression • Firewall • Anti-virus // anti-malware • Anti-spyware // anti-malware	3	Only award anti-malware once.

	c		1 mark for each letter in the correct place
			
			``
			procedure storeData()
			    if RAM is C/Full then
			        move data from RAM to A/Secondary
			Storage
			    endif
			    store data in next free space in H/RAM
			F/endprocedure
			
			procedure accessData()
			    if B/NOT(data required is in RAM) then
			        if RAM is full then
			            move unneeded data from RAM to HDD
			        endif
			        move required data from HD to RAM
			    endif
			    read data from H/RAM
			endprocedure
			``
				6	

5	**d**		1 mark per bullet to max 2 e.g. • Store BIOS • … the boot-up instructions • Stores data that should not be changed • Stores data that must be retained when the computer turns off • Store firmware/OS fundamentals	2	BOD non-volatile BOD cannot be changed

| 5 | e | | 1 mark per bullet to max 3
e.g.
Incorrect:
Embedded system has one/few functions
…tablet has multiple functions // tablet is general purpose
Embedded system is single chip
…tablet has multiple chips combined
Embedded system is part of a larger system
… tablet is a self-contained system
You can update the software
Correct:
Embedded system has one/few functions ….the tablet may only be able to perform a small number of tasks …tablet has a specific purpose …tablet's hardware is fixed …does not need/require/allow expansion Embedded systems has firmware ..you cannot update the OS in a tablet (usually) Embedded system is part of a larger system …tablet may have one microprocessor built into it | 3 | Max 2 if there is no application to the tablet |
| 5 | f | | 1 mark per bullet
e.g.
200000 / 1000
200 / 1000
1Gb = 5 videos // 80 * 5 // 80 / 0.2
400 videos
Or
80GB = 80000 MB 80000MB = 80000000KB 80000000 / 2000000 400 videos | 4 | Accept bullets 1 and 2 as division by 1000000 or 1048576

Bullets 1 and 2 may be combined

Accept 1000 or 1024 |

6	a		1 mark per bullet • All devices connected to at least one other component • All devices connected to all devices (individually or through another and not only through the printer)	2	
6	b		1 mark for each row. | Statement	True	False
---	---	---
Ethernet is a protocol	✓	
Ethernet uses wireless data transmission		✓
Ethernet can transmit data up to 100Gbits per second	✓	
Ethernet is within the TCP/IP stack	✓			4	2 ticks in 1 row = 0 mark
6	c	i	1 mark per bullet to max 3 • URL sent to DNS // request sent to DNS for/with URL • DNS **looks up/finds** to IP in its database • DNS returns IP • IF not found, DNS sends to higher level DNS	3	Request sent to DNS is NE without saying the URL is sent. Only penalise missing or incorrect term for DNS once then FT
6	c	ii	1 mark per bullet to max 3 e.g. • **Destination** IP/address • **Sender** IP/address • Packet Number • Packet size • Number of packets • Error detection method/value	3	Do not award MAC address

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